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REMARKS

1. The Patent Office Action of August 24, 2006 is hereby acknowledged. The shortened statutory period of three (3) months time period for response to the Office Action expires on November 24, 2006. This amendment is being mailed by United States Express Mail, Express Mail Label No. EV 943968065 US in a postage paid envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 22, 2006. Concurrently with the filing of this amendment, the Applicants have requested one month extension of time and have paid the required fee. Accordingly, the deadline to now file a responsive amendment is December 24, 2006. Therefore, this amendment is timely filed. In the event that the Commissioner for Patents should determine that any additional fee is required for this Amendment to be timely filed and an appropriate fee is due for that extension of time, then the Commissioner for Patents is hereby authorized to charge Deposit Account Number 18-2222 for such appropriate fee.

- 2. The original '101 Application had twenty-two (22) total claims wherein one (1) was an independent claim. The application still currently has twenty-two (22) claims of invention with only one independent claim. Accordingly, no additional filing fee is due. In the event that the Commissioner for Patents should determine that any additional fee is due, then the Commissioner for Patents is hereby authorized to charge Deposit Account Number 18-2222 for the appropriate fee.
- 3. In the Office Action of August 24, 2006, Patent Examiner Jenkins rejected Claim 1, step c., as lacking antecedent basis, Claim 14 due to a typographical error and Claim 18 due to a spelling error. The Applicants appreciate the Examiner's comments, and have corrected Claim 1, step c., and Claims 14 and 18 as follows.

In Claim 1, the phrase has now been changed to "consolidating said framed compact"

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In Claim 14, the word "Controlled" has now been changed to "controlled" with a lower case "c" and in Claim 18, the word "bellow" has been corrected to read "below".

Therefore, all of the Examiner's suggested typographical error changes and antecedent basis changes have been complied with.

4. The Examiner has rejected Claims 1-22 as being indefinite under 35 U.S.C. § 112. Specifically the Examiner states "Regarding to claim 1, the specification does not disclose a 'solid framed-billet' and the specification does not disclose 'wherein said matrix metal powder does not undergo liquidization during the entire processes of said method of producing a frame-metal-matrix composite'. Claim 2-22 are rejected that they depend from claim 1".

The Applicants have deleted the claimed element which was indicated by the Examiner. The step a. of Claim 1 is currently amended to:

producing said powder mixture by mixing a matrix metal powder and at least one reinforcement material;"

In addition, the word "solid" in step c. of Claim 1 has also been deleted.

5: The Examiner has rejected pending Claims 1-2, 4-5 and 9-12 of the '101 Application through the First Office Action as being anticipated by United States Patent 2, 027,377 to Roszler for "PRODUCTION OF NEUTRON SHIELDING MATERIAL" (hereafter "Roszler") in view of the ASM Handbook, vol. 7; and Claims 3, 6 and 8 under 35 U.S.C. § 103(a) as being obvious based on the combination of the Roszler Reference

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combined with the ASM Handbook, vol. 7.

The Applicants very respectfully disagree with the Patent Examiner because the '101 Application is structurally different from the Roszler Reference in terms of the claimed process and product. The Roszler Reference is disclosed as "a 'box-framed' method" in the '101 Application only without mentioning the patent number, and is one of the prior references. The disclosure can be found on Page 4, Lines 16 to 24 of the '101 Application.

However, in order to further enhance the patentability of the '101 Application, the Applicants have further amended Independent Claim 1 and Dependent Claims 19, 20, 21 and 22 to make them further distinguishable over the cited Roszler Reference combined with ASM Handbook, vol. 7. The amended claims will be presented in Section 6 of this Amendment. The Applicants will then introduce some court findings on interpreting the term "anticipation" under 35 U.S.C. § 102. Using the court findings as the guidelines, the Applicants will discuss why the '101 Application is patentable. Such discussion will be presented in Section 7.

6. The amended Claim 1:

"A method of producing a framed-metal-matrix-composite-sheet from a powder mixture, said method comprising:

- a. producing said powder mixture by mixing a matrix metal, powder and at least one reinforcement material;
- loading said powder mixture into a metal frame to form a framed mixture, further comprising compacting said framed mixture to form a framed compact having 50% to 95% of the theoretical density;
- c. consolidating said framed-compact to form a framed-billet that is between about 98% and about 100% of theoretical density, wherein

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said consolidation further comprising degassing of said framed compact to form a degassed-framed-compact; and"

The amended Claim 19, step b.:

"b. heating said framed-compact in said controlled environment at said degassing temperature range from about 230°C (450°F) to less than the lowest eutectic melt temperature of element powder in said matrix metal powder;"

The amended Claims 20, 21 and 22:

- The method in accordance with Claim 19, wherein said controlled "20. environment is a vacuum environment.
- 21. The method in accordance with Claim 19, wherein said controlled environment is an inert-gas environment.
- 22. The method in accordance with Claim 20 19, wherein said controlled environment is an air environment".

The Applicants believe that the above amended steps "b" and "c" of Claim 1, step b. of Claim 19, and Claims 20 to 22 are allowable since they are supported with disclosure of the '101 Application. The '101 Application specifically discloses "Step 3: Loading and The powder mixture is loaded to the frame and **Compaction of the Blended Powders** then is compacted at room temperature to form a framed-compact that is approximately 50% to 95% of the theoretical density" (Page 9, Lines 11-14), and "Step 4: Consolidating the, the framed-compact is heated to a Framed-compact to Form a Framed-Billet degassing temperature range and then is held in the temperature range for more than about one-half hour for degassing" (Page 9, Lines 17-28, Page 10, Line 1), and "The framedcompact is heated to the degassing temperature range... After the degassing, the degassed-

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framed-compacted is heated ..." (Page 10, Lines 26-28, Page 11, Line 1). "The degassing temperature range depends on the matrix metal and is form between about 230°C (450°F) to less than the lowest eutectic melt temperature of elemental powder in the matrix metal." (Page 10, Lines 1-3).

- 7. Analysis as to why the claims of the '101 Application through the present Amendment are allowable.
 - 7.1 Regarding the Examiner's rejection of the '101 Application under 35, U.S.C. 102

The Applicants will now explain the patentability of the '766 Application. The explanation will first introduce some court findings on interpretation of the term "anticipation" under 35 U.S.C. § 102 as follows:

The case of Shatterproof Galss Corp. v. Libbny-Owens Ford Co. 225 USPO 635, 644 states "If one prior art reference completely embodies the same process or product as any claim of the patent in suit, the process or product recited by the claim is said to be "anticipated' by the prior art, and the claim is therefore in valid under 102 for want of novelty" (Page 637, the First Column).

The case of Scripps Clinic v. Genentech Inc., 18 USPQ2d, 1001, 1016 states: "Invalidity for anticipation requests that all of the element and limitation of the claim are found with a single prior art reference", and "there must be no difference between the claimed invention and reference disclosure, as viewed by a person of ordinary skill in the field of invention" (Page 1010, the First column)

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The case of Connell v. Sears Roeback & Co, 220 USPQ 193, 204 states "In deciding the issue of anticipation, the trrer of fact must identify the elements of the claims, determine their meaning in light of the specification and prosecution history and identify corresponding elements disclosed in the allegedly anticipating reference".

The case of In re King, 231 USPQ 136 states "Under the principles of inherency, if a structure in the prior art necessarily functions in accordance with the limitations of a process or method claim of an application, the claim is anticipated. This is not to say that the discovery of a new use for an old structure based on unknown properties of the structure might not be patentable to the discovery as process" (P. 138, the First Column).

The Applicants will now discuss the disclosed "box-frame" method listed on Page 4, Lines 16-24 as one of the prior references of the '101 Application.

7.1.1 The Roszler Patent has been disclosed as the "box-framed" method in the '101 Application. The disadvantages of the Roszler Patent are specifically emphasized as "... to produce a MMC sheet with monolithic aluminum cladding sandwiched on either side of a MMC core that is not fully densified. Such sandwich sheet has poor mechanical and thermal properties and suffers from delamination and blistering problems in corrective environments" (Page 4, Lines 20-23).

Such disadvantages are also well known in the nuclear industry since the Roszler Patent entitled "Production of Neutron Shielding Material" is specifically for the industry. The neutron shielding plate manufactured in accordance with the Roszler Patent is called and marketed as BoralTM (Page 1.0-5, Line 4-7, Appendix I). Numerous official

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documents that report the delamination and blistering problems of Boral™ have been issued by various organizations in the nuclear industry. The Applicants include two of them, which are enclosed in Appendixes II and III of this Amendment. Appendix II is an official report from Mr. Mark Warner, Site Vice President of FPL Energy Seabrook (Nuclear Power) Station the United States Nuclear Regulatory Commission on October 6, 2003. In the report, Mr. Warner clearly points out "Specifically, inspection of test coupons revealed bulging or blistering of the aluminum cladding". Appendix III is also an official report from Mr. Farouk Eltawila, Director, Division of Systems Analysis and Regulatory Effectiveness, Office of Nuclear Regulatory Research to Mr. Ashok Thadani, Director, Office of Nuclear Regulatory Research, where the problem of "Boral Degration" is indicated on Page 2 under the heading "GSI-196". Because of such well known problems in the Roszler technology, the Applicants were inspired to invent the invention disclosed and claimed in the '101 Application.

7.1.2 Following the court finding on the case *In re Sporck* that "limitation from the specification are not read into the claims for the purpose of avoiding the art", 155 USPO 687, the Applicants provide the following Table 1 to compare the claimed elements of the '101 Application with those of the Roszler Patent.

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Table 1 Comparison of the claimed elements of the Roszler Patent and '101 Application

The Roszler Patent	The '101 Application
Claim "1. The method of making rigid neutron absorbing sheet material which comprises *forming an open-ended rectangular metal box *mixing together to produce a substantially uniformly dispersed mixture thereof *completely filling the box with material from the uniform mixture *jarring the filled box repeatedly *adding materials to ensure that the box is filled *applying the other end forming strip to the box *soaking the ingot tp bring it to an elevated temperature 800-850°F, and hot rolling the ingot at substantially the aforesaid temperature in repeated passes to reduce its thickness to form a thin rigid neutron absorbing sheet material * added by the Applicants	Claim "1. A method, said method comprising: a. producing said powder mixture by mixing a matrix metal powder and at least one reinforcement material; b. loading said powder mixture into a metal frame to form a framed mixture, further comprising compacting said framed mixture to form a framed compact having 50% to 95% of the theoretical density; c. consolidating said framed-compact to form a solid framed-billet that is between about 98% and about 100% of theoretical density, wherein said consolidation further comprising degassing of said framed compact to form a degassed-framed-compact; and d. rolling said framed-billet to said framed-metal-matrix-composite-sheet to form a plate/sheet without edge cracks. Claims 13 and 19 (steps b. and c.): "b. heating said framed-compact in a controlled environment at a degassing temperature range from about 230°C (450 °F) to less than the lowest eutectic melt temperature of elemental powder in said matrix metal powder; c. degassing said framed-compact at said degassing temperature range for at least about one-half a hour to form a degassed-framed-compact;" Claim "17. The method in accordance with Claim 13, wherein said consolidation temperature is the highest eutectic melt temperature of elemental powder in said matrix metal powder having at least one elemental metal having lower melt temperature than melt temperature of a basic elemental metal powder in said matrix metal powder. Claim "18. The method in accordance with Claim 13, wherein said consolidation temperature for said matrix metal powder containing only said basic elemental metal powder is the temperature being below melt temperature of said basic elemental metal powder containing only said basic elemental metal powder is the temperature being below melt temperature of said basic elemental metal powder.

After examining the claimed structural elements listed in the table, it is absolutely clear that the Roszler Patent is substantially different from the '101 Application in both the process and product. Specifically as to the difference in the process, the Roszler Patent applies a one-step hot rolling process at 800-850°F to directly roll the box filled with the mixture of materials, which forms the desired sheet product. In contrast, the '101 Application is first claimed to stepwise form the final sheet through an intermediate step of pressing the box filled mixture of materials to form a framed compact.

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The second distinguishable advantage as well as difference in the claimed process of the '101 Application is to apply degassing at the beginning of consolidation.

In addition to the unique degassing step, the '101 Application is also different from the Roszler Patent in applying the important temperature factor to manufacture the sheet of the metal composite, as compared to a constant elevated temperature between 800-850°F used in the Roszler Patent. Specifically during the degassing, the '101 Application first applies a temperature ranging from 230°C (450°F) to less than the lowest eutectic melt temperature of an elemental metal in the metal matrix since the metal matrix can be comprised of multiple metal elements having their specific melt temperature (Page 7, Lines 21-24), wherein one of them is the basic metal element of the matrix. The degassed-framed-compact is then consolidated to form framed-billet at a temperature that is the highest eutectic melt temperature of another elemental metal in the metal matrix metal. However, the highest eutectic melt temperature of the elemental metal is still lower than the melt temperature of the basic elemental metal in the metal matrix (Page 10, Lines 6-9). In a situation if there is only one elemental metal in the metal matrix, the degassing and consolidation temperature will be below the melt temperature of the elemental metal which acts as the basic elemental metal in the metal matrix (Page 10, Lines 14-15). For example, if the only one metal is aluminum, the degassing and consolidation temperature will be less than 660°C (1220°F). In this case, it is clear that the applied temperature of 1220°F in the '101 Application is substantially different from 800-850°F used in the Roszler Patent. The Applicants further point out that the framed-billet processed in accordance with '101 Application can be rolled to sheet at the elevated temperature or at the room temperature because the framed billet is fully

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consolidated, wherein the rolling temperature is clearly less restricted than the temperature ranging from 800-850°F in the Roszler method.

It is therefore believed that the stepwise compacting and degassing play a significant role to improve the properties of the final product sheet of composite, since hot consolidation after degassing and followed by rolling transforms the degassedframed-compact into fully metallurgically bonded framed metal-matrix-composite sheet having 98-100% of the theoretical density. In contrast, in the Roszler Patent, the sandwich sheet which is directly rolled from the boxed powder mixture at a fixed temperature from 800-850°F is not fully metallurgically bonded. That is why blistering degration is occurs to BoralTM from the Roszler technology.

Regarding the differences in the products, the Roszler technology fails in areas including the bulging and blistering of the aluminum cladding and BoralTM degration. Therefore, based on the following court finding, which is used as the guideline for interpretation of "anticipation", that " If one prior art reference completely embodies the same process or product as any claim of the patent in suit, the process or product recited by the claim is said to be 'anticipated' by the prior art, and the claim is therefore in valid under 102 for want of novelty", Shatterproof Galss Corp. v. Libbny-Owens Ford Co. 225 USPQ 635, 644 (Page 637, the First Column), the Examiner's rejection of the '101 Application under 35 U.S.C. § 102 is incorrect.

It is also pointed out that the scope of the '101 Application is to overcome disadvantages of products from the prior art including the Roszler Reference,

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which are identified as "a MMC sheet with monolithic aluminum cladding sandwiched on either side of a MMC core that is not fully densified" (Page 4, Lines 20-21), in addition to "bulging and blistering of aluminum cladding", and "boral degration" reported by other researchers (See Appendixes I, II and III). Therefore, based on the following court finding "In deciding the issue of anticipation, the trier of fact must identify the elements of the claims, determine their meaning in light of the specification and prosecution history and identify corresponding elements disclosed in the allegedly anticipating reference", Connell v. Sears Roeback & Co, 220 USPQ 193, 204, and "Disclosure may serve as dictionary for terms in claims, in such instance, disclosure may be used by court in interpreting claims and in determining their scope" In re Barr, William, and Whitmore, 170 USPQ 330, 340, the Examiner's rejection of the '101 Application under 35 U.S.C. § 102 is incorrect since the '101 Application has its scope to overcome the disadvantages of the Roszler Patent.

It is additionally pointed out that the '101 Application overcomes the disadvantages of the Roszler Reference which are commonly discovered by people in the field of the nuclear industry. Therefore, based on the following court finding, which is used as the guideline for interpretation of "anticipation", that "Under the principles of inherency, if a structure in the prior art necessarily functions in accordance with the limitations of a process or method claim of an application, the claim is ', anticipated. This is not to say that the discovery of a new use for an old structure based on unknown properties of the structure might not be patentable to the discovery as process", In re King, 231 USPQ 136 (P. 138, the First Column), the Examiner's rejection of the '101 Application under 35 U.S.C. § 102 is incorrect.

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In conclusion, the above analysis summarizes the structural differences on issues of the product, process, scope of the invention, and properties of the claimed invention between the Roszler Patent and '101 Application, and concludes that the '101 Application is not anticipated by the Roszler Patent, wherein the analysis is followed by the court findings on each issue. The Applicants believe that the currently amended independent Claim 1 of the '101 Application is patentable with regard to the claims of the Roszler Patent, and thus respectfully request the Examiner to grant allowance of Claim 1. Based on this reason, the Applicants respectfully request the Examiner further to grant allowance of all dependent Claims 2-12 since they are dependent upon the allowable Claim,

With regard to the Examiner's rejection of "Claims 1-2, 4-5, 7 and 9-12 as being anticipated by Roszler in view of the ASM Handbook, vol.7, as evidence of inherency", 7.1.2", wherein the Examiner specifically states that "With respect to the limitation on the theoretical density in step c of claim 1, it is well known as evidenced by Table 1 of page 405 of the ASM Handbook (vol. 7) that hot rolling produce about 100% theoretical tensity, therefore the even or more hot rolling steps (prior to the last rolling) of Roszler would inherently create a greater then about 98% theoretical density", the Applicants very respectfully disagree with the Examiner's statement. In fact, Table 1 of page 405 of the ASM Handbook vol. 7 is for "hydrometallurgical powder rolled nickel strip", which contrasts with "the metal powder is essentially aluminum, magnesium or stainless steel" (Claim 6) claimed from the Roszler Patent. It is well known in the powder metallurgical industry that the process of nickel rolling as illustrated in Table 1 cannot be applied to hot roll aluminum or magnesium powder for 100% of the theoretical density

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through repeatedly rolling many times. For example, the BoralTM sandwich sheet of aluminum boron carbide is hot rolled several times but it is still not fully densified and has a blistering problem. In addition, the stainless steel powder cannot be hot rolled to 100% of the theoretical density at the temperature between 800-850°F which is claimed by Roszler. The above analysis proves that a combination of the Roszler Patent combined with the ASM Handbook, vol.7 still cannot anticipate the '101 Application under 35 U.S.C 102. Therefore, the '101 Application should be patentable.

> 7.2 Regarding the Examiner's rejection of Claims 3, 6 and 8 of the '101 Application under 35 U.S.C. 103

The Examiner has rejected Claims 3, 6 and 8 due to "as applied to claims 1-2, 4-5, 7 and 9-12 above" (see statement of the Examiner, Page 5 of an Office communication, the First Office Action). The Applicants respectfully request the Examiner to grant allowance of Claims 3, 6 and 8 since they are dependent upon Claim 1, wherein Claim 1 as currently amended as discussed in Section 7.1 is now patentable. In addition, the Applicants provide the following analysis to specifically respond to the Examiner's rejection of the independent claims.

The Examiner has rejected Claim 3 and 6 because the Examiner believes that the ASM Handbook, vol. 7 (page 495 col. 2) teaches minimizing the particle size which causes more rapid shrinkage and densification during sintering. The Applicants very respectfully disagree with the Examiner. First, the rapid shrinkage and densification during sintering is not a problem for determining particle size in the '101 Application. This is because the '101 Application applies processes of consolidation and

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rolling to eliminate the problem of shrinkage. In fact, the particle size selection in the '101 Application is considered only to achieve the objective of uniformly mixing the metal powder and ceramic reinforcement powder. Second, the section of ASM Handbook quoted by the Examiner is for the injection molding process of the metal powder, such as the nickel and stainless steel powder materials, and is not for aluminum powder. It is clear that neither '101 Application nor the Roszler Patent uses an injection molding process and has no shrinkage problem in manufacturing. Therefore, it is incorrect for the Examiner to reject Claims 3 and 6 based on the combination of the ASM Handbook, vol. 7 combined with the Roszler Patent.

7.2.2 The Examiner has rejected Claim 8 because the Examiner believes that the ASM Handbook, vol. 7 (Table 10 on page 381, Table 12 on page 383) teaches that alloyed aluminum would have a higher strength. The Applicants agree with the Examiner that alloyed aluminum would have a higher strength. However, the combination of the technologies from the ASM Handbook and the Roszler Patent cannot produce the Applicants' framed-metal-matrix-composite-sheet which has 98% to 100% theoretical density. Therefore, it is incorrect for the Examiner to reject Claim 8 based on the combination of the ASM Handbook, vol. 7 combined with the Roszler Patent.

In conclusion, from the above analysis, the Applicants respectfully request the Examiner to grant allowance of Claims 3, 6 and 8 since they are not obvious under the combination of ASM Handbook combined with the Roszler Patent.

8. Therefore, it is respectfully submitted that the present '101 Application is now in condition for allowance and issuance of a Notice of Allowance of the '101 Application is respectfully solicited.

Respectfully submitted,

Date: December 22, 2000

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I hereby certify that this correspondence is being deposited with the United States Postal Service as Express Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

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